

# Effects of exercise on outcomes of sarcopenia: an umbrella review of meta-analyses of randomized controlled trials

## Appendix Tables

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#### Table S1 Search strategy

##### i. Ovid MEDLINE(R) and Epub Ahead of Print, In-Process, In-Data-Review & Other Non-Indexed Citations, Daily and Versions(R) <1946 to April 26, 2021>

- 1 exp sarcopenia/ (5282)
- 2 (sarcopeni\* or myopeni\* or dynaponi\*).tw. (9377)
- 3 ((muscle or muscular) adj2 (atroph\* or wasting\* or weak\* or loss\* or depletion\*)).tw. (44598)
- 4 1 or 2 or 3 (52293)
- 5 meta-analysis.pt. (130268)
- 6 exp Meta-Analysis as Topic/ (21555)
- 7 exp meta-analysis/ (130268)
- 8 meta-analysis.mp. (211954)
- 9 exp systematic review/ (151232)
- 10 exp Systematic Reviews as Topic/ (5075)
- 11 systematic review.mp. (212298)
- 12 systematic\* review\*.tw. (206677)
- 13 (metaregression or meta-regression or "meta regression").tw. (9861)
- 14 (metanalysis or meta-analysis or "meta analysis").tw. (171271)
- 15 (metasynthesis or meta-synthesis or "meta synthesis").tw. (1346)
- 16 ("realist review" or "realist synthesis" or "rapid review" or "pragmatic review" or "umbrella review").tw. (2243)
- 17 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 (342512)
- 18 4 and 17 (873)

##### ii. Embase <1974 to 2021 April 26>

- 1 exp sarcopenia/ (13182)
- 2 (sarcopeni\* or myopeni\* or dynaponi\*).tw. (15486)
- 3 ((muscle or muscular) adj2 (atroph\* or wasting\* or weak\* or loss\* or depletion\*)).tw. (66601)
- 4 1 or 2 or 3 (80137)
- 5 exp Meta-Analysis as Topic/ (46000)
- 6 exp meta-analysis/ (217531)
- 7 meta-analysis.mp. (320441)
- 8 exp systematic review/ (297311)
- 9 exp Systematic Reviews as Topic/ (26720)
- 10 systematic review.mp. (376010)
- 11 systematic\* review\*.tw. (25796)6
- 12 (metanalysis or meta-analysis or "meta analysis").tw. (224487)
- 13 (metaregression or meta-regression or "meta regression").tw. (12512)
- 14 (metasynthesis or meta-synthesis or "meta synthesis").tw. (1533)
- 15 ("realist review" or "realist synthesis" or "rapid review OR pragmatic review" or "umbrella review").tw. (1202)
- 16 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 (539811)
- 17 4 and 16(1738)

### **iii. EBM Reviews - Cochrane Database of Systematic Reviews <2005 to April 21, 2021>**

- 1 (sarcopeni\* or myopeni\* or dynaponi\*).tw. (18)
- 2 ((muscle or muscular) adj2 (atroph\* or wasting\* or weak\* or loss\* or depletion\*)).tw. (388)
- 3 sarcopenia.mp. (14)
- 4 1 or 2 or 3 (393)
- 5 meta-analysis.mp. (8781)
- 6 systematic review.mp. (7505)
- 7 systematic\* review\*.tw. (9280)
- 8 (metaregression or meta-regression or "meta regression").tw. (928)
- 9 (metanalysis or meta-analysis or "meta analysis").tw. (8782)
- 10 (metasynthesis or meta-synthesis or "meta synthesis").tw. (16)
- 11 ("realist review" or "realist synthesis" or "rapid review" or "pragmatic review" or "umbrella review").tw. (67)
- 12 5 or 6 or 7 or 8 or 9 or 10 or 11 (9796)
- 13 4 and 12(389)

**v. Web of Science:**

1. Topic: (sarcopen\* OR myopeni\* OR dynaponi\*) (18758)
2. Topic: ((muscle OR muscular) AND (atroph\* OR wasting\* OR weak\* OR loss\* OR depletion\*)) (229793)
3. #1 OR #2 (241786)
4. Topic: ("systematic review" OR "systematic\* review\*" OR metanalysis OR meta-analysis OR "meta analysis" OR metaregression OR meta-regression OR "meta regression" OR metasynthesis OR meta-synthesis OR "meta synthesis" OR "realist review" OR "realist synthesis" OR "rapid review" OR "pragmatic review" OR "umbrella review") (432740)
5. #3 AND #4 (2427)

**Table S2 GRADE scale for quality assessment of evidence**

| <b>Outcome</b>   | <b>No. of RCT</b> | <b>Risk of bias</b> | <b>Inconsistency</b> | <b>Indirectness</b> | <b>Imprecision</b> | <b>Bublication bias</b> | <b>Effect (95% CI)</b>     | <b>Quality</b> |
|--|-------------------|---------------------|----------------------|---------------------|--------------------|-------------------------|----------------------------|----------------|
| <b>1. Exercise compared to control for outcomes in people with sarcopenia</b>                  |                   |                     |                      |                     |                    |                         |                            |                |
| <b>Muscle strength</b>   |                   |                     |                      |                     |                    |                         |                            |                |
| Grip strength  | 13                | Not serious         | Not serious          | Not serious         | Not serious        | Not serious             | MD 1.98 (1.18 to 2.78)     | High           |
| keen extension strength  | 2                 | Not serious         | Not serious          | Not serious         | Not serious        | Not serious             | MD 0.14 (0.03 to 0.26)     | High           |
| <b>Physical performance</b>  |                   |                     |                      |                     |                    |                         |                            |                |
| Usual walking speed  | 10                | Not serious         | Serious              | Not serious         | Not serious        | Serious                 | MD 0.09 (0.02 to 0.17)     | Low            |
| Max walking speed  | 2                 | Not serious         | Serious              | Not serious         | Not serious        | Not serious             | MD 0.26 (0.14 to 0.38)     | Moderate       |
| TUG test   | 6                 | Not serious         | Serious              | Not serious         | Not serious        | Not serious             | MD -1.36 ( -2.19 to -0.53) | Moderate       |
| Five chair stand time  | 4                 | Not serious         | Serious              | Not serious         | Serious            | Not serious             | MD -1.92 ( -3.87 to 0.04)  | Low            |
| <b>2. Exercise plus nutrition compared to nutrition for outcomes in people with sarcopenia</b> |                   |                     |                      |                     |                    |                         |                            |                |
| <b>Muscle strength</b>   |                   |                     |                      |                     |                    |                         |                            |                |
| Grip strength  | 2                 | Not serious         | Serious              | Not serious         | Serious            | Not serious             | MD 0.54(CI-2.90 to 3.99)   | Low            |
| <b>Physical performance</b>  |                   |                     |                      |                     |                    |                         |                            |                |
| Usual walking speed  | 3                 | Not serious         | Not serious          | Not serious         | Serious            | Not serious             | MD 0.06 ( -0.01 to 0.14)   | Moderate       |
| Max walking speed  | 2                 | Not serious         | Serious              | Not serious         | Serious            | Not serious             | MD 0.15 (-0.15 to 0.44)    | Low            |
| <b>3. Exercise compared to control for outcomes in people with obesity sarcopenia</b>          |                   |                     |                      |                     |                    |                         |                            |                |
| <b>Muscle strength</b>   |                   |                     |                      |                     |                    |                         |                            |                |
| Grip strength  | 7                 | Not serious         | Serious              | Not serious         | Not serious        | Not serious             | MD 1.70 (0.36 to 3.04)     | Moderate       |
| <b>Physical performance</b>  |                   |                     |                      |                     |                    |                         |                            |                |
| Usual walking speed  | 5                 | Not serious         | Serious              | Not serious         | Not serious        | Not serious             | MD 0.2 (0.07 to 0.33)      | Moderate       |

**Note:** SMI: skeletal muscle index, SMM: Skeletal Muscle Mass, ASM: appendicular skeletal mass, TSM: Total skeletal muscle mass, TUG: time up and go, MD: mean difference, SMD: standardized mean difference

**Table S3 Methodological quality assessment of included meta-analyses according to the AMSTAR 2**

| <b>Author</b>            | <b>No.<br/>of 1</b> | <b>No. of<br/>2</b> | <b>No.of<br/>3</b> | <b>No. of<br/>4</b> | <b>No.<br/>of 5</b> | <b>No.o<br/>f 6</b> | <b>No. of<br/>7</b> | <b>No. of<br/>8</b> | <b>No. of<br/>9</b> | <b>No.<br/>of<br/>10</b> | <b>No.<br/>of 11</b> | <b>No.<br/>of 12</b> | <b>No.<br/>of 13</b> | <b>No.<br/>of 14</b> | <b>No.<br/>of 15</b> | <b>No.<br/>of 16</b> | <b>AMSTA<br/>R 2</b>      |
|--------------------------|---------------------|---------------------|--------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|--------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|---------------------------|
| <b>Bao W,2020</b>        | Yes                 | Yes                 | No                 | Partial<br>Yes      | Yes                 | No                  | Yes                 | No                  | Yes                 | No                       | No                   | No                   | No                   | Yes                  | Yes                  | Yes                  | <b>Critically<br/>low</b> |
| <b>Hsu KJ, 2019</b>      | Yes                 | No                  | No                 | Partial<br>Yes      | No                  | Yes                 | Yes                 | No                  | Partial<br>Yes      | No                       | No                   | No                   | No                   | No                   | Yes                  | Yes                  | <b>Critically<br/>low</b> |
| <b>Vlietstra L, 2018</b> | Yes                 | No                  | No                 | Partial<br>Yes      | Yes                 | Yes                 | Yes                 | Partial<br>Yes      | Yes                 | No                       | Yes                  | No                   | No                   | Yes                  | Yes                  | No                   | <b>Critically<br/>low</b> |
| <b>Wu PY, 2021]</b>      | Yes                 | Yes                 | No                 | No                  | Yes                 | Yes                 | No                  | Yes                 | Yes                 | No                       | No                   | No                   | No                   | Yes                  | Yes                  | Yes                  | <b>Critically<br/>low</b> |
| <b>Yin YH, 2020</b>      | Yes                 | Yes                 | No                 | Yes                 | Yes                 | Yes                 | Yes                 | Partial<br>Yes      | Yes                 | No                       | Yes                  | No                   | No                   | Yes                  | Yes                  | Yes                  | <b>Low</b>                |
| <b>Yoshimura Y, 2017</b> | Yes                 | Yes                 | No                 | Partia<br>Yes       | Yes                 | Yes                 | Yes                 | Yes                 | Yes                 | No                       | Yes                  | No                   | No                   | Yes                  | Yes                  | Yes                  | <b>Low</b>                |

**Note:**

No. of 1. Did the research questions and inclusion criteria for the review include the components of PICO?

No. of 2. Did the report of the review contain an explicit statement that the review methods were established prior to the conduct of the review and did the report justify any significant deviations from the protocol?

No. of 3. Did the review authors explain their selection of the study designs for inclusion in the review?

No. of 4. Did the review authors use a comprehensive literature search strategy?

No. of 5. Did the review authors perform study selection in duplicate?

No. of 6. Did the review authors perform data extraction in duplicate?

No. of 7. Did the review authors provide a list of excluded studies and justify the exclusions?

No. of 8. Did the review authors describe the included studies in adequate detail?

No. of 9. Did the review authors use a satisfactory technique for assessing the risk of bias (RoB) in individual studies that were included in the review?

No. of 10. Did the review authors report on the sources of funding for the studies included in the review?

No. of 11. If meta-analysis was performed did the review authors use appropriate methods for statistical combination of results?

No. of 12. If meta-analysis was performed, did the review authors assess the potential impact of RoB in individual studies on the results of the meta-analysis or other evidence synthesis?

No. of 13. Did the review authors account for RoB in individual studies when interpreting/discussing the results of the review?

No. of 14. Did the review authors provide a satisfactory explanation for, and discussion of, any heterogeneity observed in the results of the review?

No. of 15. If they performed quantitative synthesis did the review authors carry out an adequate investigation of publication bias (small study bias) and discuss its likely impact on the results of the review?

No. of 16. Did the review authors report any potential sources of conflict of interest, including any funding they received for conducting the review?

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## Appendix Figures

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Figure S1 Funnel plots for grip strength

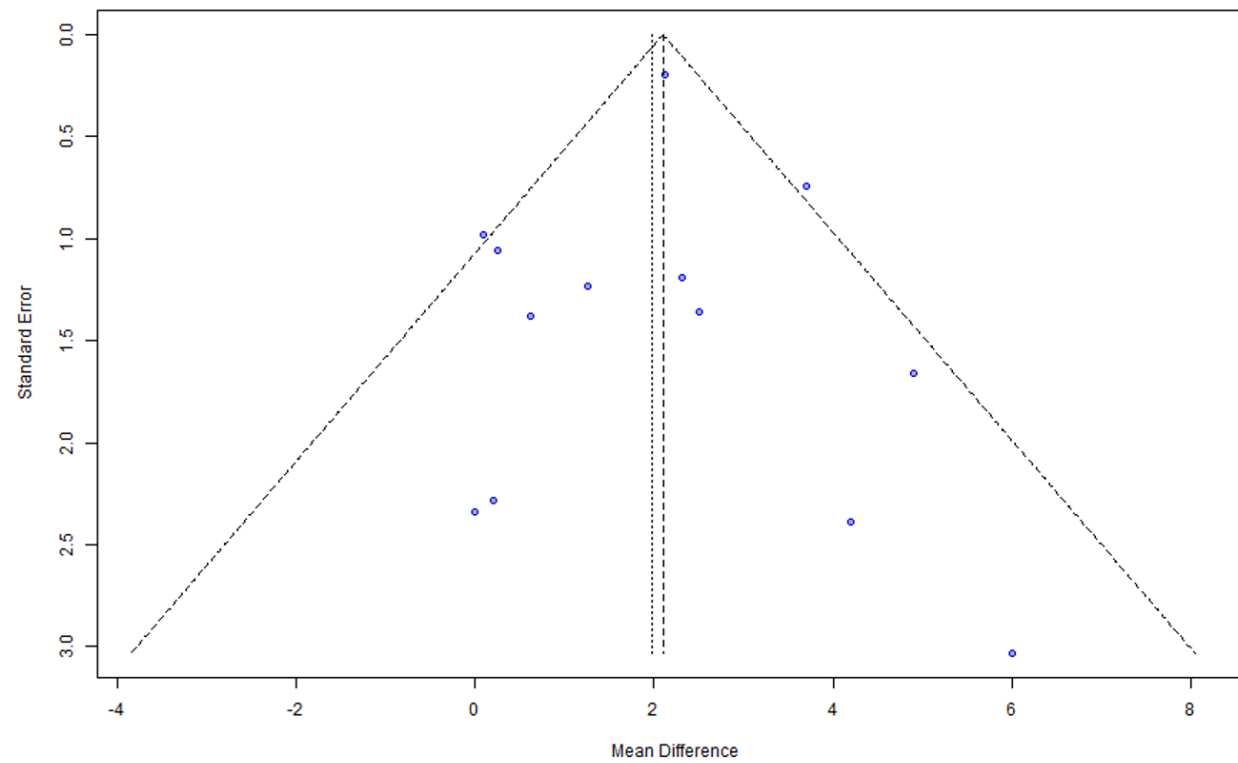




Figure S2 Funnel plots for usual walking speed

